Biology 2401 – Anatomy & Physiology I

Summer I Syllabus

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Office hours: 15 minutes before and after class or by appointment

Lecture room: BT 117 M-H 6:00 PM  
Lab room: IT 104 M-H 8:30 PM

The information contained in this syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.

Catalog Course Description: Anatomy & Physiology I is intended for students entering field of study in allied health sciences, social work, physical therapy, physical education or any student who needs a basic understanding of the structure and function of the human body. This course is the first semester of a two semester sequence and includes a study of terminology, the chemistry, structure and function of cells, four basic types of tissue, integument, skeletal system, muscular system and nervous system. Three hours of lecture and three hours of lab each week.

Required Textbooks:
Hole’s Human Anatomy & Physiology 13th ed. Shier/Butler/Lewis, 2012

Publisher: McGraw-Hill Publishers
ISBN Number: 978-0-07-337827-5
ISBN Number: 978-0-07-735307-0

Recommended Reading:
Read assigned chapters in lecture book, explore chapter activities on book web site.
Read assigned lab exercise and report.

Student Learning Outcomes:
1. Define anatomy and physiology, explain the importance of the relationship between structure and function and be able to describe directional terms and anatomical positions.
2. Understand the role of the following molecules in living systems: water, carbohydrates, lipids, proteins, and nucleic acids by describing the interrelationships between the basic building blocks of the macromolecules and the role that each plays within the cell.
3. Explain the nature of the fluid mosaic model of the plasma membrane in reference to passage of materials through it; describe the structure and function of major eukaryotic cellular organelles.
4. Describe the general make-up of a tissue, list and be able to recognize the primary tissue types and examples of each type.
5. Describe the general structure and function of the integumentary system including epidermis and dermis and the accessory structures associated with the skin.
6. List components of the skeletal system, name the functions of each and identify the bones of the human skeleton. Be able to discuss bone formation and bone repair.
7. Describe the structure of a fibrous, cartilaginous and synovial joint. Be able to give examples of each.
8. Summarize the major characteristics and functions of skeletal, smooth and cardiac muscle. Be able to identify the major muscles of the human body.
9. List the divisions of the nervous system and describe the characteristics and functions of each.
10. Describe the structure of neurons and the functions of their components.

**Exemplary Education Objectives:**
The objective of the study of a natural sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the basis for building and testing theories.

The exemplary educational core objectives for natural sciences are:

3.1 to understand and apply method and appropriate technology to the study of natural sciences;

3.2 to recognize scientific and quantitative methods and the differences between theses approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing;

3.3 to identify and recognize the differences among competing scientific theories;

3.4 to demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies;

3.5 to demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.

**NTCC Academic Honesty Statement:**
“Students are expected to complete course work in an honest manner, using their intellects and resources designated as allowable by the course instructor. Students are responsible for addressing questions about allowable resources with the course instructor. NTCC upholds the highest standards of academic integrity. This course will follow the NTCC Academic Honesty policy stated in the Student Handbook.”

**Academic Ethics:**
The college expects all students to engage in academic pursuits that are beyond academic reproach. Students are expected to maintain complete honesty and integrity in their academic pursuit. Academic dishonesty such as cheating, plagiarism and collusion is unacceptable and may result in disciplinary action. Refer to the Student Handbook for more information on this subject.

**Student Responsibilities/Expectations:**
“Students are expected to complete course work in an honest manner, using their intellects and resources designated as allowable by the course instructor.” Students displaying unsatisfactory and/or unsafe behaviors such as copying, horseplay, plagiarism, negligence and theft of property in lab or lecture will be first warned of their behavior. A copy of warning will be given to the Vice President of Instructional Services. A second
warning will be carried out in the same manner. However, a third warning will result in mandatory withdrawal from class.
Lab safety is a major concern of NTCC. Many students are preparing to work in a clinical environment and need to learn to work safely and in harmony with others in a lab setting. It is very important that you obey the rules and regulations described in this course.
Turn cell phones off or place on vibrate before coming to class. If you receive an important call, or text message, step outside the classroom to answer the call. Sending or receiving text messages and/or phone calls in class may result in the loss of your phone.
NTCC is a non-smoking campus. Smoking is allowed on the student parking lot in a smoking-hut or in your personal vehicle.

**Attendance Policy:**
Regular and punctual attendance at all scheduled classes is required by every student. Students who are absent, for any reason, are still responsible for lecture materials and any required assignments. If you are absent, e-mail or phone your instructor (communication). Excessive absences will ultimately hinder your success in this course. Withdrawal from BIOL 2401 must be done by **2 July 2014** to receive a “W”. However, failure to abide by this institutional rule will result in you receiving an “F” for this course. Lack of attendance may result in being dropped from the class with a “W” by the instructor.

**Inclement weather policy:** In case of inclement weather, classes may be canceled at NTCC. Check the NTCC home website for current information or tune in to one of the following radio stations for information concerning possible cancellation of classes: KPXI-FM 100.7; KXAL-FM 103.1; KYKM-FM 97.7; KIMP-AM 960; KEGG-AM 1560

**Americans with Disabilities Act (ADA) Statement:**
It is the policy of Northeast Texas Community College to provide reasonable accommodations for qualified individuals who are students with disabilities. This college will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student’s responsibility to arrange an appointment with a College counselor to obtain a Request for Accommodations form. For more information, please refer to the Northeast Texas Community College Catalog or Student Handbook.

**Family Educational Rights and Privacy Act (FERPA):**
Family Educational Rights and Privacy Act (FERPA) is a federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. FERPA gives parents certain rights with respect to their children's educational records. These rights transfer to the student when he or she attends a school beyond the high school level. Students to whom the rights transferred are considered “eligible students”. In essence, a parent has no legal right to obtain information concerning the child's college records without the written consent of the student. In compliance with FERPA, information classified as "directory information" may be released to the general public without the written consent of the student unless the students makes a request in writing. Directory information is defined as: student’s name, permanent address and/or local address, telephone listing, dates of attendance, most recent previous education institution attended and other information including major, field of study, degrees, awards received and participation in officially recognized activities/sports.
Lecturers and Discussion:
Traditional lecture with power points.

Evaluation/Grading Policy:
A (90-100), B (80-89), C (70-79), D (60-69), F (0-59)
Traditional evaluation/grading for BIOL 2401 based on 100%.

Exams:
5 lecture exams, 4 lab practicals and 1 lecture comprehensive exam.

Methods of Evaluation:

Lecture:
- Five major exams - 50% of final grade (exam dates vary)
- One comprehensive final exam - 25% of final grade
- A Makeup exam will be available to students absent on scheduled exam day.

Lab: (25% of final grade)
Lab time may vary on certain days, dependent on the time needed to complete necessary lab assignments and procedures or time needed to complete lecture.
- Daily lab (20% of lab grade)
- 4 Lab practical (80% of lab grade)

Final Evaluation:
- Lecture – 50% (lecture average 2x)
- Lab average – 25%
- Comprehensive Exam – 25%
- (Lecture average + Lecture average + Lab average + Comprehensive exam) / 4 = 100%

Assignments: tentative schedule for evaluations
Exam 1 - 12 June; Exam 2 – 19 June; Exam 3 – 26 June; Exam 4 - 3 July; Exam 5 – 9 July
Comprehensive Exam - 10 July
Lab Practical 1 – 19 July; Lab Practical 2 – 26 June; Lab Practical 3 – 3 July; Lab Practical 4 – 10 July

Other Course Requirements:
BIOL 2401 Syllabus – Summer I 2013

Tentative Lecture/Lab Schedule:
9 June – Introduction/Syllabus, Lecture Chapter 1; Lab
10, 11, 12 June – Lecture Chapter 1, 2, 3, 4; Lab
12 June - Lecture Exam 1; Lab
16, 17, 18, 19 June - Lecture Chapter 5, 6; Lab
19 June - Lecture Exam 2; Lab Practical 1
23, 24, 25, 26, June - Lecture Chapter 7, 8; Lab
26 June - Lecture Exam 3; Lab Practical 2
30 June, 1, 2, 3 July - Lecture Chapter 9, 10; Lab
3 July - Lecture Exam 4; Lab Practical 3
7, 8, 9 July - Lecture Exam 5
10 July – Comprehensive Exam and Lab Practical 4
Introduction:
Anatomy & Physiology is a course at NTCC for students entering fields of study in allied health sciences, psychology, physical therapy, physical education, biology, geology, ecology, anthropology, agriculture and/or any student who needs a basic understanding of the structure and function of the human body and who has an entry level background in biology or nursing. This course is designed to be completed in two semesters. The topics discussed in this course are organized so that they form a core that is suitable to satisfy the prerequisites for student’s advancement in their chosen field of study.

Course Outline:

Chapter 1 – Introduction to Anatomy and Physiology
Chapter concepts - Students should gain mastery of the following concepts:
- A&P blossomed during the Renaissance and was then well received by society
- Anatomy & Physiology are descriptive sciences therefore students must learn the proper terminology to be conversant in the subject matter
- Organizational hierarchy of the human body consists of cells, tissues, organs, systems and the organism
- The nervous and endocrine system work together to regulate body homeostasis
- Negative and positive feedback mechanisms regulate body activity

Chapter 2 – Chemical Bases of Life
Chapter concepts – Students should gain mastery of the following concepts:
- Living organisms use chemical reactions to sustain life.
- Chemical bonds can be formed, broken or rearranged.
- Electrolytes and pH help maintain homeostasis.

Chapter 3 – Cells
Chapter concepts – Students should gain mastery of the following concepts:
- Cells are the basic structural and functional unit of living things.
- Major structures of cells include the cell membrane, cytoplasm and nucleus.
- Mitosis for growth and repair.

Chapter 4 – Cellular Metabolism
Chapter concepts – Students should gain mastery of the following concepts:
- Cell metabolism utilizes chemical reactions to store and release energy.
- Cellular respiration produces energy through anaerobic and aerobic respiration.
- Nucleic acid molecules used for synthesis of proteins and control cell activity.

EXAM 1

Chapter 5 - Tissues (histology)
Chapter concepts - Students should gain mastery of the following concepts:
- Tissues are aggregates of cells and cellular makeup determines tissue function. There are four basic tissue types in the body (epithelial, connective, muscle, nervous).
- Epithelia tissues lines all body surfaces and cavities and functions in protection, secretion and absorption
- Connective tissue is formed from specialized cells and their surrounding matrix, provides structural and metabolic support for other tissues and organs.
- Muscle tissue is responsible for movement and is composed of three different cell types. Each cell type is highly specialized for a specific type of movement.
- Nervous tissue is composed of neurons and neuroglea cells. Neurons conduct electrical impulses throughout the body. Neuroglea cells provide support for neurons.

Chapter 6 - Skin and the Integumentary System
Chapter concepts - Students should gain mastery of the following concepts:
- The integument is an organ because it is constructed of several different tissues that have a common function.
- The integument is composed of two principal layers: epidermis and dermis.
- The function of the skin includes protection from the environment, sensory perception and thermal regulation.
- Nails, hair and glands are epidermal derivatives associated with the integument that perform necessary and sometimes vital functions.
- The condition of the integument can be an indication of the health of the tissue in a specific area or of the overall health of the individual.

EXAM 2

Chapter 7 - Skeletal System
- Extra Credit: Write paper based on bones, guideline will be given, 20 possible points
Chapter concepts - Students should gain mastery of the following concepts:
- There are two types of bone tissue: spongy and compact.
- The basic unit of bone tissue is the osteon.
- Most bones develop from cartilaginous model or fibrous template.
- Calcium and phosphate levels are carefully regulated by the endocrine system.
- The axial skeleton is composed of the skull, vertebra, rib cage, auditory ossicle and hyoid bone.
- The skull contains several cavities that house the brain and sensory organs.
- The vertebral column consists of cervical, thoracic, lumbar, sacral and coccygeal vertebrae.
- The rib cage is composed of the sternum, costal cartilage and ribs attached to the thoracic vertebrae.
- The appendicular skeleton is composed of the bone of the pectoral girdle, upper extremity, pelvic girdle and lower extremity.
- The bones of the pectoral girdle and upper extremity are adapted for movement and muscular attachment.
- The bones of the pelvic girdle and lower extremities are adapted for locomotion and support.

Chapter 8 - Joints of the Skeletal System (Articulation)
Chapter concepts - Students should gain mastery of the following concepts:
- Arthology should not be studied as an isolated science, but rather as a sub-science within the more dynamic discipline of kinesiology.
- Synovial joints function as fulcra, as the bones that act as levers move in response to the force of muscular contractions.
- The three principal types of joints are structurally and functionally different.
- The bones of synovial joints do not articulate with each other; rather, the articular cartilage of one bone articulates with the articular of another bone.

- Synovial joints are adapted for self-maintenance through the production of synovial fluid within the joint cavity. Synovial joints are also extremely vulnerable to trauma and do not heal readily once they are injured.

**EXAM 3**

**Chapter 9 - Muscular System**

Chapter concepts - Students should gain mastery of the following concepts:

- The four basic properties of all muscle tissues are irritability, contractibility, extensibility and elasticity.
- Three types of muscle tissue are skeletal, smooth and cardiac.
- The origin of a muscle is the more stationary attachment. The insertion is the more moveable attachment.
- Different muscle types have different structural arrangements and different mechanisms of contraction.
- Each muscle is named according to shape, location, attachment, size, orientation of muscle fibers, relative position or function. Learning the derivation of the muscle makes mycology more meaningful.
- Students should be able to identify the location and action of the muscles they are required to know.
- Muscles generally function as synergistic groups and should be learned as such. Identifying the antagonistic muscle in such synergistic groups enables the students to better understand muscle action.

**Chapter 10 - Nervous System I: Basic Structure and Function**

Chapter concepts - Students should gain mastery of the following concepts:

- Nervous tissue is composed of neurons and neuroglial cells.
- Action potentials are electrical signals sent along neurons.
- Neurons communicate across synapses by means of chemicals called neurotransmitters.

**EXAM 4**

**Chapter 11 - Nervous System II: Divisions of the Nervous System**

➔ Extra Credit: 12 cranial nerves and the function, guideline will be given, 20 possible points

Concepts - Students should gain mastery of the following concepts:

- The human brain is highly specialized for reasoning and assimilating knowledge
- The spinal cord conducts impulses to and from the brain, consists of gray and white matter, has ascending and descending tracts
- Brain and spinal cord (CNS) are covered with meninges and bathed in cerebrospinal fluid
- The peripheral nervous system (PNS) consists of nerves that transport impulses to and from the CNS
  - There are 12 pair of cranial nerves and 31 pair of spinal nerves
- Spinal nerves may combine and split into nerve networks known as plexuses
- Most reflex arcs consists of a receptor, sensory neuron, association neuron, motor neuron and an effector (organ or gland)
- The autonomic nervous system (ANS) is a functional component of the nervous system, composed of sympathetic and parasympathetic divisions, controlled by higher centers of the brain

**EXAM 5**
Instructor: Sue Ferrell

E-mail: sferrell@ntcc.edu  Phone: MS Office (903) 434-8292 (Ms. JoAnn Rodriguez)


Course Description: This is a 1 credit hour lab that must be taken concurrently with Biology 2401. The activities and exercises will support the lecture material.

Attendance policy: Regular and punctual attendance is expected. Students who leave before completion of lab, who do not participate in lab exercises or do not aid in cleaning their work area at the end of lab, will lose credit on their grade. Students displaying unsatisfactory and/or unsafe behavior such as horseplay, plagiarism, negligence or theft of property in lab will first be given a warning. A copy of the warning will be given to the Vice President of Instructional Services. The third warning will result in mandatory withdrawal from class.

Evaluation: Biology 2401 lab counts as 25% of the final BIOL 2401 course grade.
   Lab reports (15% of lab), pre-lab quizzes and/or quizzes (5% of lab).
   Lab practical (80% of lab).
   Lab grade based on average of lab reports, quizzes, practical and participation.

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NO consumption of FOOD or BEVERAGE allowed in lab during lab time. Please consume all food and beverages before entering the lab.
NTCC is a tobacco-free campus; smoking is permitted in personal vehicles and smoking huts.
Turn cell phones off or place on vibrate before coming to lab. If you receive an important call, step outside the lab to answer the call.
NO consumption of FOOD or BEVERAGE allowed in lab during lab time.

Tentative Lab schedule:  

Lab Orientation and Lab Safety  
Exercise 2 - Body Organization and Terminology  
Exercise 4 - Care and Use of the Microscope  
Exercise 6 - Movement Through Membrane  
Exercise 5 - Cell Structure and Function  
Exercise 7 - Cell Cycle  
Exercise 8 - Epithelial Tissue  
Exercise 9 - Connective Tissue  
Exercise 10 - Muscle and Nervous Tissue  
Exercise 11 - Integumentary System  

Lab Practical #1  
Exercise 12 - Bone Structure and Classification  
Exercise 13 - Organization of the Skeleton  
Exercise 14 - The Skull  
Exercise 15 - Vertebral Column and Thoracic Cage  
Exercise 16 - Pectoral Girdle and Upper Limb  
Exercise 17 - Pelvic Girdle and Lower Limb  
Exercise 19 - Joints  

Extra Credit - Name the skull bones, associated structures and features (20 possible points.)  

Lab Practical #2  
Exercise 20 - Skeletal Muscle Structure  
Exercise 22 - Muscle of the Face, Head and Neck  
Exercise 23 - Muscle of the Chest, Shoulder and Upper Limb  
Exercise 24 - Muscles of the Deep Back, Abdominal Wall and Pelvic Outlet  
Exercise 25 - Muscles of the Hip and Lower Limb  
Exercise 26 - Surface Anatomy and Handout  
Exercise 62 - Fetal Pig Dissection: Musculature  

Extra Credit - Name skeletal muscles on model (20 possible points)  

Lab Practical #3  
Exercise 27 - Nervous Tissue  
Exercise 28 - Spinal Cord and Meninges  
Exercise 29 - Reflex Arc and Reflexes and Handout  
Exercise 30 - Brain and Cranial Nerves  
Exercise 32 - Dissection of Sheep Brain  

Lab Practical #4